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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,753

07/20/2005

Nobuhiro Yabunouchi

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EXAMINER

CHOI, LING SIU

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/542,753	<b>Applicant(s)</b> YABUNOUCHI ET AL.	
	<b>Examiner</b> Ling-Siu Choi	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12, 13 and 15-29 is/are pending in the application.
- 4a) Of the above claim(s) 17-23 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 28 and 29 is/are allowed.
- 6) ☒ Claim(s) 1-9, 12, 13, 15, 16 and 24-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/30/2008</u>  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

1. The request filed on 09/23/2008 for a Request for Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 10/542,753 is acceptable and a RCE has been established. An action on the RCE follows.

2. This Office action is in response to the Amendment filed 09/23/2008. Claims 10-11 and 14 were canceled and claims 28-29 have been added. Claims 1-9, 12-13, and 15-29 are now pending, wherein claims 17-23 have been withdrawn from further consideration due to the Restriction/Election requirement.

### *Claim's Analysis*

3. Summary of claim 1:

A solid catalyst component for olefin polymerization obtained by reacting the following compounds (i), (ii) and (iv); or (i), (ii), (iii) and (iv):	
i	a halogen-containing titanium compound;
ii	an alkoxy-containing magnesium compound obtained by reacting <u>metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium;</u>
iii	a halogen-containing silicon compound $\text{Si}(\text{OR}^9)_r\text{X}_{4-r}$

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	<p>X = a halogen atom;  <math>R^9</math> = a hydrocarbon group; and  r = an integer of 0 to 3; and</p>
iv	<p>an electron-donating compound represented by the following general formula (I):</p> $  \begin{array}{c}  R^1 \\    \\  R^2-O-C-C-C-O-R^3 \\     \quad   \quad    \\  O \quad H \quad O  \end{array}  $ <p><math>R^1</math> = a linear or branched <math>C_{&gt;1}</math> alkyl group; and  <math>R^2</math> and <math>R^3</math> = a linear or branched <math>C_{1-20}</math> alkyl group.</p>

Summary of claim 9:

A solid catalyst component for propylene-ethylene copolymerization obtained by reacting the following compounds (a), (b) and (c); or (a), (b), (c) and (d):	
a	a magnesium compound;
b	a titanium compound;
c	<p>an electron-donating compound represented by the following general formula (II): and</p> $  \begin{array}{c}  R^4 \\    \\  R^2-O-C-C-C-O-R^3 \\     \quad   \quad    \\  O \quad R^5 \quad O  \end{array}  $ <p><math>R^2</math> and <math>R^3</math> = a linear or branched <math>C_{1-20}</math> alkyl group;  <math>R^4</math> = a linear, branched or cyclic <math>C_{1-20}</math> alkyl group;  <math>R^5</math> = H or <math>C_{1-2}</math> alkyl group;  <math>R^4</math> and <math>R^5</math> may be bound together to form a ring</p>
d	<p>a silicon compound</p> $Si(OR^{15})_tX_{4-t}$

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	<p>X = a halogen atom;  <math>R^{15}</math> = a hydrocarbon group; and  t = an integer of 0 to 4.</p>
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Summary of claim 28:

A method of producing a solid catalyst component for olefin polymerization comprising:		
A	<p><u>reacting</u> metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium to obtain an alkoxy-containing magnesium compound (ii); and</p>	
B	<p><u>bringing</u> the alkoxy-containing magnesium compound (ii) with compounds (i) and (iv) or with compounds (i), (iii) and (iv)</p>	
	i	a halogen-containing titanium compound
	iii	<p>a halogen-containing silicon compound represented by the following general formula (V):</p> $Si(OR^9)_rX_{4-r} \quad (V)$ <p>X = a halogen atom;  <math>R^9</math> = a hydrocarbon group; and  r = an integer of 0 to 3</p>
	iv	<p>an electron-donating compound represented by the following general formula (I):</p> $  \begin{array}{c}  R^1 \\    \\  R^2-O-C-C-C-O-R^3 \\     \quad   \quad    \\  O \quad H \quad O  \end{array}  \quad (I)  $ <p><math>R^1</math> = a linear or branched <math>C_{\text{at least } 1}</math> alkyl group;  <math>R^2</math> and <math>R^3</math> independently = a linear or branched <math>C_{1-20}</math> alkyl group</p>

Summary of claim 29

A method of producing a solid catalyst component for propylene-ethylene copolymerization comprising:		
A	<u>reacting</u> metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium to obtain an alkoxy-containing magnesium compound (a); and	
B	<u>bringing</u> the alkoxy-containing magnesium compound (a) and compounds (c) and (d) in contact with compound (b) at 120 to 150°C, and thereafter	
C	<u>washing</u> the contact product with an inert solvent at 100 to 150°C	
	b	a titanium compound;
	c	<p>an electron-donating compound represented by the following general formula (II):</p> $  \begin{array}{c}  \text{R}^4 \\    \\  \text{R}^2-\text{O}-\text{C}-\text{C}-\text{C}-\text{O}-\text{R}^3 \\     \quad   \quad    \\  \text{O} \quad \text{R}^5 \quad \text{O}  \end{array}  \quad (\text{II})  $ <p> <math>\text{R}^4</math> = a linear, branched or cyclic <math>\text{C}_{1-20}</math> alkyl group;  <math>\text{R}^5</math> = H or <math>\text{C}_{1-2}</math> alkyl group; and  <math>\text{R}^2</math> and <math>\text{R}^3</math> independently = a linear or branched <math>\text{C}_{1-20}</math> alkyl group;                 </p>
	d	<p>a silicon compound represented by the following general formula (IX):</p> $\text{Si}(\text{OR}^{15})_t\text{X}_{4-t} \quad (\text{IX})$ <p> <math>\text{X}</math> = a halogen atom;  <math>\text{R}^{15}</math> = a hydrocarbon group; and                 </p>

	t = an integer of 0 to 4.
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***Claim Rejections -35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-9, 12-13, 15-16, and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kioka et al. (US 5,055,528) in view of Yukimasa et al. (US 6,423,782 B1)..

Kioka et al. disclose a catalyst system to produce a propylene polymer [copolymer of propylene and ethylene], comprising (A) **a solid titanium catalyst component**; (B) an organoaluminum compound; and (C) **an organic silicon compound**, wherein the **solid titanium catalyst component** comprises magnesium, titanium, halogen, and a polycarboxylic acid ester as essential ingredients, which is obtained by the contact of a magnesium compound, a titanium compound, and the polycarboxylic acid ester and wherein the titanium compound is represented in the general formula of  $Ti(OR)_9X_{4-9}$  which can be  $TiCl_4$ ,  $TiBr_4$ , or  $TiI_4$ ; the magnesium compound can be alkoxy magnesium halide such as ethoxy magnesium chloride, isopropoxy magnesium chloride, butoxy

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magnesium chloride, or octoxy magnesium chloride, which reads on “an alkoxy-containing magnesium compound obtained by reacting metal magnesium, an alcohol and a halogen”; the polycarboxylic acid ester can be dibutyl methylmalonate, diethyl ethylmalonate, diethyl isopropylmalonate, diethyl butylmalonate, diethyl diethylmalonate, diethyl diisobutylmalonate, diethyl di-n-butylmalonate; and the organic silicon compound is  $\text{SiR}^{11}_m(\text{OR}^{12})_{4-m}$  [col. 4, lines 56-68; col.5, lines 1-28; col.6, lines 23-26 and 51-61; col. 8, lines 44-52; Example 1 (copolymer of propylene and ethylene); claim 1].

The difference between the present claims and the disclosure of Kioka et al. is the requirement of a halogen-containing silicon compound to be used in the solid titanium catalyst component.

Yukimasa et al. disclose a catalyst for propylene polymerization, comprising (A) a solid catalyst component obtained by the contact of a magnesium compound, a titanium compound, and an electron donor compound; (B) an organoaluminum compound, and (C) an organosilicon compound, wherein the magnesium compound is  $\text{Mg R}^4\text{R}^5$  with  $\text{R}^4$  and  $\text{R}^5$  each representing a hydrocarbon group,  $\text{OR}^6$ , or a halogen atom, which can be butoxymagnesium chloride, ethoxymagnesium bromide, or ethoxymagnesium iodide; the titanium compound is  $\text{TiX}^1_p(\text{OR}^8)_{4-p}$ , which can be titanium tetrachloride; the electron donor compound is polycarboxylate; the silicon compound is  $\text{Si}(\text{OR}^3)_m\text{X}^1_{4-m}$  [ $m=0-3$ ], which is preferably silicon tetrachloride (col. 7, lines 49-67; col. 8, lines 1-41; col. 9, lines 1-24, 44-62; col. 10, lines 20-56; claim 1). Yukimasa et al. further disclose that the magnesium compound is obtained by the



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contact of metal magnesium with a halogen and an alcohol, wherein the halogen includes iodine, chlorine, bromine, and fluorine and iodine is preferred; the alcohol includes methanol, ethanol, propanol, butanol, or octanol (col. 8, lines 29-32). Yukimasa et al. furthermore disclose that the contact of the magnesium compound and the electron donor compound with the titanium compound is carried on at 125°C and the resulting product is washed with dewatered octane at 125°C [Examples 1-5 (col. 21, lines 19-36)]. Yukimasa et al. also disclose that “[t]he silicon compound improves the catalyst activity and the stereospecificity of the catalyst, and will reduce the fine powder content of the polymer produced in the presence of the catalyst” [*motivation*] (col. 10, lines 30-33). It is noted that Kioka et al. are silent on the use of the halogen-containing silicon compound in the solid titanium catalyst component. However, Kioka et al. do recognize that “[a]nother electron may be present in the titanium catalyst component” (col. 6, lines 1-2). In light of such benefits, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the silicon compound disclosed by Yukimasa et al. in the solid titanium component of Kioka et al. and thereby obtain the present claims.

### ***Allowable Subject Matter***

6. Claims 28-29 are allowed.

7. The following is an examiner's statement of reasons for allowance:

The present claims are allowable over the closest references: Kioka et al. (US

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5,055,528).

Kioka et al. do not teach or fairly suggest the claimed method, wherein the method comprises an alkoxy-containing magnesium compound that is obtained by reacting metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium. Furthermore, in view of the Declaration of Shojiro Tanase, the use of the claimed alkoxy-containing magnesium compound leads to a high catalyst activity and results in a polymer with excellent powder morphology.

In light of the above discussion, it is evident as to why the present claims are patentable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

8. Applicant's arguments filed 09/23/2008 have been fully considered but they are not persuasive.

"Applicants' claims 1 and 9 recite a solid catalyst component obtained by reacting certain compounds including an alkoxy-containing magnesium compound obtained by reacting metal magnesium, an alcohol and a halogen and/or a halogen-containing

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compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium. Kioka discloses the use of alkoxy magnesium halides (see Kioka at col. 6, lines 23-26); however, Kioka does not disclose an alkoxy-containing magnesium compound that is obtained by reacting metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium. The use of the claimed alkoxy-containing magnesium compound achieves a high catalyst activity and a polymer with excellent powder morphology as evidenced in the Declaration of Shojiro Tanase submitted on November 5, 2007.”

It is noted that claims 1-9, 12-13, 15-16, and 24-27 are drawn to a product- by-process, wherein the alkoxy-containing magnesium compound is obtained by reacting metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium. The caselaw has held that “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Thus, the limitation of the process to make the alkoxy magnesium halide do not carry the patentable weight. Furthermore, Kioka et al. do recognize the use of alkoxy magnesium halide,

“In addition, contrary to the assertion in the Office Action, the process of Kioka's Example 1 does not yield an alkoxy-containing magnesium compound but a compound having the formula  $\text{MgCl}_2(\text{CsHI7OH})_x$  (see enclosed article: Di Noto et al., "MgCl<sub>2</sub>-supported Ziegler-Natta catalysts: A structural investigation by X-ray diffraction and Fourier-transform IR spectroscopy on the chemical activation process through MgCl<sub>2</sub>-ethanol adducts," *Die Makromolekulare Chemie* 2003, 193(7), 1653-1663).”

It is noted that Kioka et al. do recognize the use of alkoxy magnesium halide in preparing the catalyst (col. 6, lines 23-28) even though the resulting magnesium compound is not alkoxy magnesium halide.

“Yukimasa does not teach what is missing from Kioka. Specifically, Yukimasa does not teach or suggest the amount of halogen used when preparing the alkoxy-containing magnesium compound.”

Attention is drawn to claims 1 and 9, wherein “an alkoxy-containing magnesium compound obtained by reacting metal magnesium, an alcohol and a halogen and/or a halogen-containing compound containing at least 0.0001 gram atom of halogen atoms per mol of the metal magnesium” can be interpreted as that the amount of halogen is only required for the halogen-containing compound if it is used to prepare the alkoxy-containing magnesium compound.

### **Conclusion**

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reach on 571-272-1114.

/Ling-Siu Choi/

Primary Examiner, Art Unit 1796

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December 8, 2008